

Distribution and conservation status of two amphipods in the Dandenong Ranges – *Austrogammarus australis* (Sayce) and *Austrogammarus haasei* (Sayce)

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Abstract

Austrogammarus australis (Sayce) and *A. haasei* (Sayce) (Amphipoda: Paramelitidae) are two amphipod species of conservation significance located in the Dandenong Ranges, Victoria. Original type localities for the species were in and near the Dandenong Ranges. Subsequent surveys have revealed that both species are no longer found at their type localities (most likely due to impacts associated with urbanisation), however they do occur at other sites in the Dandenong Ranges. As the species have a limited distribution in Victoria, they are listed under the *Flora and Fauna Guarantee Act* 1988. The Draft Advisory List of Threatened Invertebrates classifies *A. australis* as 'Vulnerable' and *A. haasei* as 'Critically Endangered'. This paper summarises results from three surveys for both species with additional notes on changes in their distribution over time. A slight increase in the number of sites at which both species were found was evident from surveys for the species in 1995 and 1999. A survey for the species in 2001 in the Yarra Ranges, an area located close by with similar topography, stream types and vegetation, failed to locate any specimens of either species, highlighting the limited distribution of the species. There have been no taxon-specific surveys for either species across the Dandenong Ranges since 1999. (*The Victorian Naturalist* 124 (4), 2007, 230-235)

Introduction

Background

Amphipods are an ancient crustacean group consisting of small, laterally flattened animals, usually between one and two centimetres long (Williams 1980). A diverse fauna of amphipods inhabits Australian freshwaters, particularly in Tasmania, south-eastern and south-western Australia (Williams and Barnard 1988). They occur in a wide range of permanent and ephemeral habitats, including streams, wetlands, caves and crayfish burrows (Horwitz 1990). Australia has a higher density of freshwater amphipod genera (per km² of habitat) than other continents and this is thought to reflect the age of the group, their primary adaptation to permanent and non-tropical freshwater and the large scale changes that have occurred in the nature of the Australian climate over geological time (Williams and Barnard 1988).

The Dandenong Amphipod - Austrogammarus australis and Sherbrooke Amphipod - Austrogammarus haasei

A. australis (family Paramelitidae) was originally described as *Gammarus aus-*

tralis by Sayce in 1901. *A. haasei* (family Paramelitidae) was originally described as *Gammarus haasei* by Sayce in 1902. Both species were placed in a new genus, *Austrogammarus*, erected by Barnard and Karman (1983). *Austrogammarus* is regarded as the most primitive genus of the Australian paramelitids (Williams and Barnard 1988) and now includes seven species; *A. australis*, *A. haasei*, *A. smithi*, *A. saycei*, *A. spinatus* and *A. multispinatus* and another, *A. telsosetosus*, described by Barnard and Williams (1995). *A. smithi* is found in Tasmania, *A. telsosetosus* is known only from South Australia, while the other species occur to the east of Melbourne in Victoria. Recent findings suggest there are new species and extensions of the range of current species in other parts of Victoria (J Bradbury 1999 pers. comm. May).

Distribution and survey history

The type locality for *A. australis* was given as Dandenong Creek near Bayswater, but other locations where the species was subsequently located were given as: 'a tributary of Monbulk Creek' and 'in a gully

halfway to Sassafras'. The last known record of the species (prior to surveys commencing in 1995, reported in this paper) was in 1911 (Williams and Barnard 1988). The type locality is extremely modified (urban drains) and the species has not been recorded from there since (Williams and Barnard 1988).

On the basis of the lack of new records and the modification to streams around the type locality, the species was classified as 'Presumed Extinct' by Horwitz (1990) and Department of Conservation and Natural Resources (1993). The species was listed under the *Flora and Fauna Guarantee Act* 1988 and an Action Statement was produced recommending the surveying of creeks in the Dandenong Ranges to determine the existence of the species in the area (Department of Conservation and Environment 1991). The Action Statement was later updated (Doeg and Papas 2003) to incorporate findings from these surveys (Doeg *et al.* 1996; Papas *et al.* 1999). The species is presently classified as 'Vulnerable' in the Draft Advisory List of Threatened Invertebrate Fauna (Department of Sustainability and Environment unpubl.).

The type locality for *A. haasei* was given as Monbulk, Vic., 250 m altitude (Williams and Barnard 1988) – suggesting it may have been in Sassafras or Emerald creeks above the town of Monbulk (Doeg *et al.* 1996). The species was listed under the *Flora and Fauna Guarantee Act* 1988 after recommendations made following the 1995 survey (Doeg *et al.* 1996) and is presently classified as 'Critically Endangered' in the Draft Advisory List of Threatened Invertebrate Fauna (Department of Sustainability and Environment unpubl.). An Action Statement was produced recommending the surveying of creeks in the Dandenong Ranges to determine the existence of the species in the area (Doeg and Papas 2004).

Dandenong Ranges survey – 1995

Following recommendations made in the Action Statement (Department of Conservation and Environment 1991), a survey for the Dandenong Amphipod was conducted in June, 1995. Forty-six sites were surveyed in the Dandenong Ranges,

east of Melbourne (Doeg *et al.* 1996). Samples were captured with a sweep net of mesh size 300 microns that was swept through organic debris, along stream banks, kicked under rocks and the streambed and scraped against large woody debris. Individual rocks and wood debris were also lifted and examined by eye for the presence of amphipods. *A. australis* was found at nine sites in the upper reaches of Olinda, Dandenong and Monbulk Creeks, and *A. haasei* was found at two sites (Doeg *et al.* 1996) (Fig. 1).

Dandenong Ranges survey – 1999

A second survey for *A. australis* and *A. haasei* was conducted in May and June 1999 (Papas *et al.* 1999). Forty-four sites were sampled using the same method as Doeg *et al.* (1996). A sweep net of mesh 300 μm was used to capture a sample by sweeping the net through organic debris, along stream banks, kicking under rocks and the streambed and scraping large woody debris – 10 m of stream was sampled this way. Material collected was placed in a large sorting tray and all amphipods seen in the sample over a period of 0.5 person hours were collected. Thirty-six of these sites had been sampled during June 1995 and the remainder were new sites thought to be suitable for *A. australis* or *A. haasei*. Some of the 1995 sites were considered too disturbed/impacted to support *A. australis* or *A. haasei* and hence were not included in the 1999 survey (Papas *et al.* 1999). Sites were located throughout the Dandenong Ranges, from all major drainage basins and included sites within the Dandenong National Park, as well as streams from the suburbs of Bayswater, Ferntree Gully, Belgrave, Monbulk, Kallista, Kalorama, Lilydale, Mt Evelyn and Upwey.

In the 1999 survey, *A. australis* was recorded at 17 sites and *A. haasei* at five sites (Fig. 2). All sites containing amphipods were located in the least disturbed areas, with no amphipods found in the more disturbed, lowland sections of streams. Of the 38 sites common to both the 1995 and 1999 surveys, in 1999, *A. australis* was found at 12 sites compared to nine in 1995 and *A. haasei* at five sites compared to two in 1995. This represents

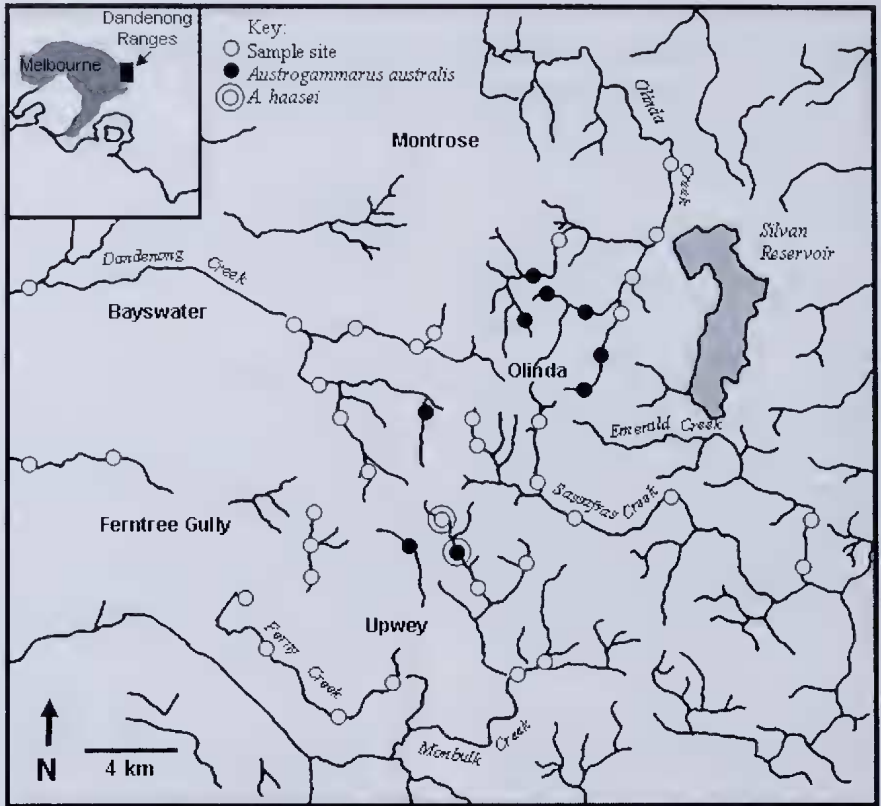


Fig. 1. Map showing the location of sites where *Austrogammarus australis* and *A. haasei* were collected in the 1995 survey (Doeg *et al.* 1996); reproduced and modified with permission from the author.

an apparent increase in the distribution of these species between 1995 and 1999 (Papas *et al.* 1999). Abundances of *A. australis* were generally higher in 1999 (Fig. 3) and there was an increase in abundance of *A. haasei* at some sites in 1999 (Fig. 4).

Subsequent to the 1999 survey, the Action Statement for *A. australis* was updated to include the new distribution and population information (Doeg and Papas 2000; Doeg and Papas 2003). It was recommended that the conservation status of the species be changed to 'Vulnerable' pending the outcome of surveys of other forested areas surrounding the Dandenong Ranges for the presence of *A. australis*, as it was considered that the species might be present in these areas.

Two streams sampled previously by Doeg *et al.* (1996) and Papas *et al.* (1999) were surveyed for *A. australis* in 2002 and

2003 for an honours project that examined the effect of stormwater runoff on the distribution and abundance of the amphipod (Kerr 2004). *A. australis* was present in relatively high abundance at sites in both streams.

Yarra Ranges survey

Following the recommendations in the *A. australis* Action Statement (Doeg and Papas 2000), a survey was subsequently undertaken in the Yarra Ranges, approximately 80 km east of Melbourne, in an area ecologically similar to the Dandenong Ranges. Sites were located in the Yarra Ranges National Park, Melbourne Water closed catchments and State Forest, bounded by the Moorondah Catchment to the north-west, Armstrong Creek Catchment to the north-east and Starvation Creek Catchment to the south.

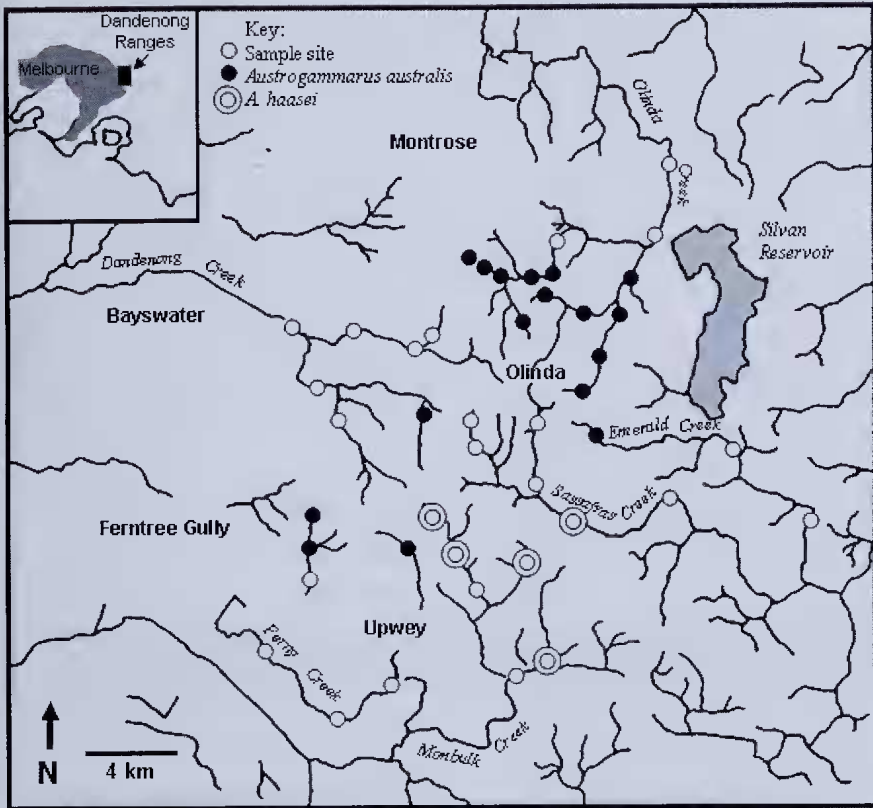


Fig. 2. Map showing the location of sites where *Austrogammarus australis* and *A. haasei* were collected in May and June 1999 (Papas *et al.* 1999); reproduced and modified with permission from the author.

Thirty sites of similar altitude and stream order to those sampled in the Dandenong Ranges in 1995 and 1999 were inspected in this area during May 2002 (Papas and Crowther 2002). Of these sites, nine were deemed suitable for sampling as they approximated stream types in the Dandenong Ranges that contained *A. australis* and/or *A. haasei*. Unsuitable sites were generally those occurring in faster-flowing, larger streams, or streams that were dry. Sites were sampled using the same method as Doeg *et al.* (1996) and Papas *et al.* (1999). No *Austrogammarus* specimens were collected at the nine sample sites. It is unlikely the absence of *Austrogammarus* from these sites is a result of human-induced disturbance as all sites were relatively undisturbed (Papas and Crowther 2002).

Changes in distribution

A. australis is no longer found at its type locality, Bayswater (a Melbourne suburb), most likely due to impacts associated with urbanisation (particularly stormwater runoff) (Walsh 2000; Walsh *et al.* 2004; Kerr 2004). *A. haasei* has also not been recorded at locations near its type locality, Monbulk Creek, again, most likely due to human-induced impacts associated with urbanisation. Note that the exact location of the type locality is unknown.

The known distribution of *A. australis* and *A. haasei* increased between 1995 and 1999. However, this was not a large area increase and these species remain restricted to the Dandenong Ranges. In the 1999 survey, *A. australis* was recorded from five additional sites and *A. haasei* from three additional sites. Numbers also increased up to ten-fold for both species (Papas *et al.*

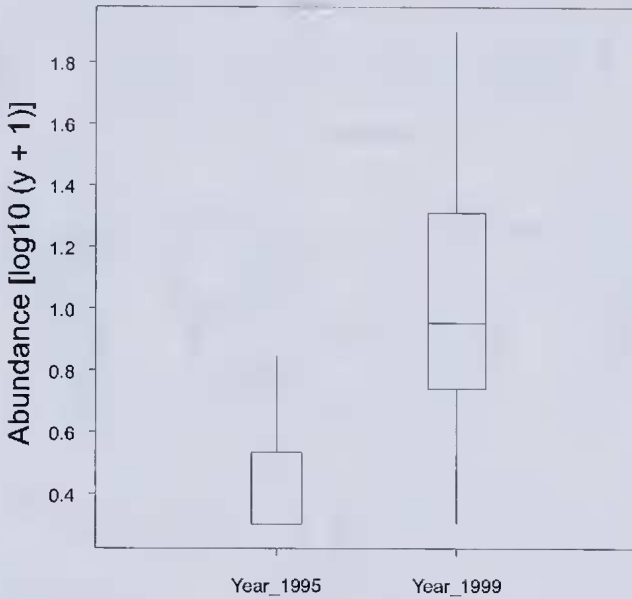


Fig. 3. Box plot comparing abundance of *Austrogammarus australis* from 1995 and 1999 surveys. Abundance data were transformed using $[\log_{10}(y+1)]$. The middle 50% of data lie within the box, with the median represented by a solid line. Whiskers indicate minimum and maximum values.

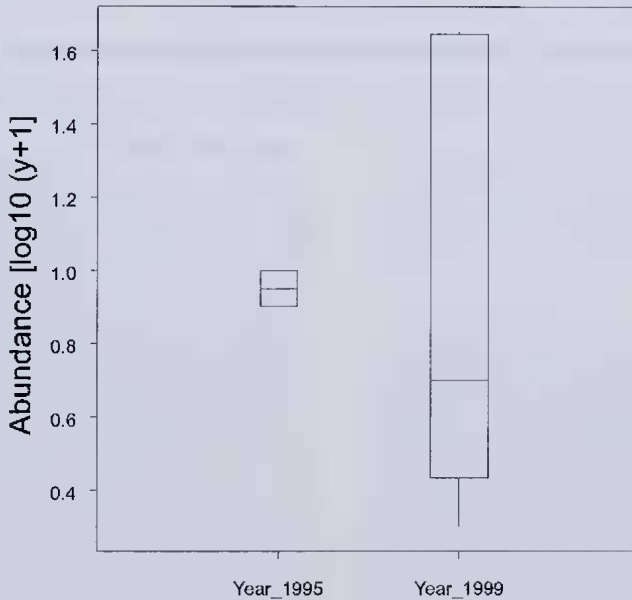


Fig. 4. Box plot comparing abundance of *Austrogammarus haasei* from 1995 and 1999 surveys. Abundance data were transformed using $[\log_{10}(y+1)]$. The middle 50% of data lie within the box, with the median represented by a solid line. Whiskers indicate minimum and maximum values.

1999). The reasons for this increase are uncertain; however, some possibilities include natural annual variation in population size, unusually dry conditions between 1996 and 1999 and small variations in the sampling effort and/or strategy. Annual variation in aquatic macroinvertebrate populations has been suggested as an important factor in explaining population changes over time (Resh *et al* 1987; Clements *et al.* 1989). The sampling effort/strategy employed in 1999 may have resulted in the collection of more amphipods as areas of organic debris were targeted; these areas were known to be a favourable habitat for *Austrogammarus* species (J Bradbury 1999 pers. comm. May).

All sites where *A. australis* was located were characterised by undisturbed, riparian zones with native vegetation, and 14 (66%) of these sites were located within national park or other reserves. *A. haasei* was similarly located at sites with riparian zones of relatively undisturbed, native vegetation. Four of these sites (80%) were located within the Dandenong Ranges National Park.

Additional information on the ecological requirements of *A. australis* is provided in Kerr (2004). A new survey in the Dandenong Ranges, targeting sites from the 1999 survey and new sites that may contain either species, is now needed to determine the present distribution of both species.

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Austrogammarus australis photographed by Phil Papas